This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently amended) A digital intermediate frequency ~~QAM~~ Quadrature Amplitude Modulation modulator using parallel processing without the use of a multiplier, comprising:

a serial-to-parallel data converter operatively connected to receive serial data, wherein said serial-to-parallel data converter converts a string of serial data to a plurality of parallel data;

an I and Q mapper operatively connected to receive said plurality of parallel data and determine its I and Q locations;

a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the I LUTs are configured I_1 to I_N, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

a plurality of adders operatively connected to receive and add said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of

-4-

said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

a plurality of registers operatively connected to collect and store said output data comprising IQ_1 to IQ_{IQN}; and

a digital to analog converter operatively connected to convert said output data comprising IQ_1 to IQ_{IQN} to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

2. (Currently amended) A digital intermediate frequency QAM Quadrature Amplitude Modulation modulator using parallel processing without the use of a multiplier, comprising:

a serial-to-parallel data converter operatively connected to receive serial data, wherein said serial-to-parallel data converter converts a string of serial data to a plurality of parallel data;

an I and Q mapper operatively connected to receive said plurality of parallel data and determine its I and Q locations;

a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_x, wherein X is the highest number of Q LUTs of said plurality of LUTs;

a plurality of adders operatively connected to receive and add said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

a plurality of registers operatively connected to collect and store said output data comprising IQ_1 to IQ_{IQN};

at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN};

at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}; and

a digital to analog converter operatively connected to convert said odd subscript data and said even subscript data to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

3. (Currently amended) The digital intermediate frequency ~~QAM~~ Quadrature Amplitude Modulation modulator using parallel processing without the use of a multiplier of claim 2, wherein said at least one multiplexer operatively connected to collect from said plurality of registers the subscript

-6-

output data comprising only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN} comprises nx2 multiplexers, where n is an integer, and wherein <u>said</u> at least one multiplexer <u>is</u> operatively connected to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising IQ_1 to IQ_{IQN} comprises nx2 multiplexers.

4. (Currently amended) A digital intermediate frequency ~~QAM~~ <u>Quadrature Amplitude Modulation</u> modulator using parallel processing <u>without the use of a multiplier</u>, comprising:

a plurality of look-up-tables (LUTs) operatively connected to receive and store I and Q locations, wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

a plurality of adders operatively connected to receive and add said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

a plurality of registers operatively connected to collect and store said output data comprising IQ_1 to IQ_{IQN};

a first multiplexer operatively connected to collect from said plurality of registers only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN};

a second multiplexer operatively connected to collect from said plurality of registers only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}; and

a digital to analog converter operatively connected to convert said odd subscript data and said even subscript data to analog data, <u>wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.</u>

5. (Currently amended) The digital intermediate frequency ~~QAM~~ <u>Quadrature Amplitude Modulation</u> modulator using parallel processing <u>without the use of a multiplier</u> of claim 4, wherein said ~~at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN}~~ <u>first multiplexer</u> comprises nx2 multiplexers, where n is an integer, and wherein ~~at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}~~ <u>said second multiplexer</u> comprises nx2 multiplexers.

6. (Currently amended) A digital intermediate frequency ~~QAM~~ Quadrature Amplitude Modulation modulator using parallel processing without the use of a multiplier, comprising:

a plurality of look-up-tables (LUTs) operatively connected to receive and store I and Q locations, wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

a plurality of adders operatively connected to receive and add said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

a plurality of registers operatively connected to collect and store said output data comprising IQ_1 to IQ_{IQN}; and

a digital to analog converter operatively connected to convert said output data comprising IQ_1 to IQ_{IQN} to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

7. (Currently amended) A method for processing data with a digital intermediate frequency QAM modulator using parallel processing without the use of a multiplier, comprising:

receiving and converting a string of serial data into a plurality of parallel data;

determining the I and Q locations of said plurality of parallel data;

storing said I and Q locations in a plurality of look-up-tables (LUTs), wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_x, wherein X is the highest number of Q LUTs of said plurality of LUTs;

receiving and adding said I and Q locations stored within said plurality of LUTs, wherein ~~said~~ a plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

collecting and storing said output data comprising IQ_1 to IQ_{IQN} in a plurality of registers; and

converting said output data comprising IQ_1 to IQ_{IQN} to analog data in a digital to analog converter, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

8. (Currently amended) A method for processing data in a digital intermediate frequency QAM modulator using parallel processing <u>without the use of a multiplier</u>, comprising:

receiving and converting a string of serial data to a plurality of parallel data;

receiving said plurality of parallel data in an I and Q mapper and determine the I and Q locations of said plurality of parallel data;

receiving and storing said I and Q locations in a plurality of look-up-tables (LUTs), wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

receiving and adding said I and Q locations stored within said plurality of LUTs in a plurality of adders, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

collecting and storing in a plurality of registers said output data comprising IQ_1 to IQ_{IQN};

collecting, in a first multiplexer, from said plurality of registers, the subscript output data comprising only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN};

collecting, in a second multiplexer, from said plurality of registers, the subscript output data comprising only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}; and

converting, a digital to analog converter, said odd subscript data and said even subscript data to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

9. (Currently amended) The method of claim 8, wherein said ~~at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN}~~ first multiplexer comprises nx2 multiplexers, where n is an integer, and wherein ~~at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}~~ said second multiplexer omprises nx2 multiplexers.

10. (Currently amended) A method for processing data in a digital intermediate frequency QAM modulator using parallel processing without the use of a multiplier, comprising:

receiving and storing in a plurality of look-up-tables (LUTs), I and Q locations, wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

receiving and adding in a plurality of adders said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

collecting and storing in a plurality of registers said output data comprising IQ_1 to IQ_{IQN};

collecting in a first multiplexer only odd subscript output data from said output data comprising IQ_1 to IQ_{IQN};

collecting in a second multiplexer only even subscript output data from said output data comprising IQ_1 to IQ_{IQN}; and

converting in a digital to analog converter said odd subscript data and said even subscript data to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

11. (Currently amended) The method of claim 10, wherein said ~~at least one multiplexer operatively connected to collect from said plurality of registers~~

~~the subscript output data comprising only odd subscript output data from said output data comprising IQ₁ to IQ_IQN~~ <u>first multiplexer</u> comprises nx2 multiplexers, where n is an integer, and wherein ~~at least one multiplexer operatively connected to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising IQ₁ to IQ_IQN~~ <u>said second multiplexer</u> comprises nx2 multiplexers.

12. (Currently amended) A method for processing data with a digital intermediate frequency ~~QAM~~ <u>Quadrature Amplitude Modulation</u> modulator using parallel processing <u>without the use of a multiplier</u>, comprising:

receiving and storing, in a plurality of look-up-tables (LUTs) I and Q locations, wherein the I LUTs are configured I_1 to I_n, wherein N is the highest number of I LUTs of said plurality of LUTs, wherein the Q LUTs are configured Q_1 to Q_X, wherein X is the highest number of Q LUTs of said plurality of LUTs;

receiving and adding in a plurality of adders said I and Q locations stored within said plurality of LUTs, wherein said plurality of adders are configured A_1 to A_{AN}, wherein AN is the highest number of adders of said plurality of adders, wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising IQ_1 to IQ_{IQN};

collecting and storing in a plurality of registers said output data comprising IQ_1 to IQ_{IQN}; and

converting in a digital to analog converter said output data comprising IQ_1 to IQ_{IQN} to analog data, wherein said Quadrature Amplitude Modulation modulator does not include a multiplier.

-15-